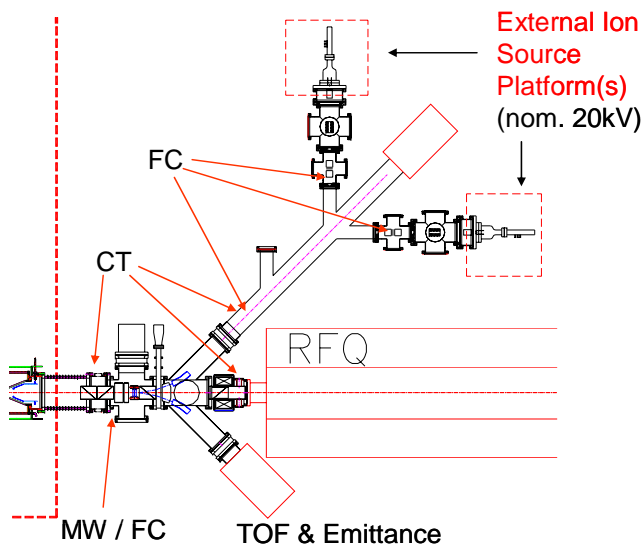


## **WBS 1.3 Diagnostic Systems**

**Michelle Wilinski**

**July 25-27, 2005**

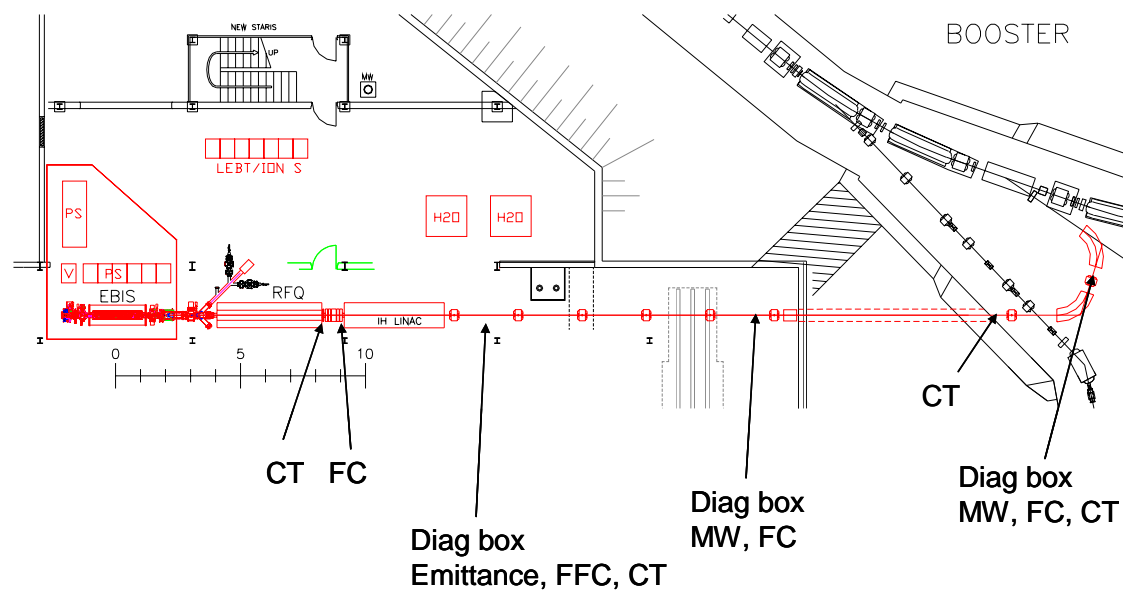
# Instrumentation Layout



CT=Current Transformer, FC=Faraday Cup  
MW=Profile Monitor Multiwire, TOF=Time of Flight

Layout in MEBT & HEBT

Layout in LEBT & External Ion Injection Lines



# Specifications

Device	Location and Quantity					Dyn. Range	Resolution	Data Structure	Ref to Similar Device	Comments
	EIL	LEBT	MEBT	HEBT	Totals					
<b>Current Transformer</b> Toroid	1	2	2	2	7	10uA-10mA	0.1uA	Pulse waveform	Similar to TTB	Calibrated measurement Digitized waveform & avg. current
<b>Faraday Cup</b> Fast Faraday Cup				1	1	10uA-10mA	0.1uA	Pulse waveform	Existing to be reused	Typical CAD design, plunging
Faraday Cup	2	1	2	2	7	10uA-10mA	0.1uA	Pulse waveform	Similar to TTB	Digitized waveform & avg. current 3 combinations with profile monitors
<b>Profile Monitor</b> Multiwire		1		2	3	10-uA-10mA	1mm	Profile	2 from TTB. 1 purchased	Typical CAD design, plunging 32H X 32V wire spacing Gated integrator electronics

- Risk => low as diagnostics for EBIS will be similar to those already installed in TTB (Tandem-to-Booster) line
  - Basic designs exist, modify designs for adaptation into EBIS (physical dimensions, requirements, etc.)

# Current Transformer (CT)

- Ferrite toroid wound with signal wire to measure ion beam current characteristics with respect to time in a non-destructive measurement



- C-AD made TTB style CTs to be used
- At present one spare TTB CT is on the EBIS test stand

# Faraday Cup (FC)/Fast FC (FFC)

- **FC:** Detector head pneumatically plunged into beam path to collect entire ion beam; captured charge measured as a current in electronics
- Fully destructive measurement – can also be used as beamstop
- Provides average current and pulse waveform data with respect to time
- **FFC:** Existing coaxial FFC to be reused
- Has bandwidth in GHz, allows observation of 100MHz bunch structure of beam



# Profile Monitor – Multiwire (PM)

- Measures transverse beam profiles by plunging 32 x 32 array of wires into beam path
- Installed in combination with FC on a dual feedthrough at 3 locations
- 2 multiwire heads from TTB will be reused, purchase one new



# Major Procurements & Deliverables

---

- Major procurements (direct '05 \$):
  - FC/PM mechanical parts (feedthroughs and sensor heads)  
=> ~\$105k
  - 8 Ch. Integrators (PM) => ~\$48k
- Deliverables:
  - 7 Faraday Cup systems, 1 Fast Faraday Cup system
  - 7 Current Transformer systems
  - 3 Profile Monitor systems

# Cost & FTEs

- Estimated Cost

WBS	Description	Direct FY'05K\$			
		Mat'l	Labor	Contingency	Total
1.3	Diagnostics	290	175	\$95 (20%)	560

- Labor hours/equivalents

Resource Category	estimated hours
Scientist	100
Engineer	1,000
Designer	475
Technician	1,050
Management	125
<b>Total</b>	<b>2,750</b>
<b>Full Time Equivalents</b>	<b>1.6</b>